

REMARKS

Applicant thanks the Examiner for the thorough examination of the application of this application. The FINAL Office Action, however, maintained the previous rejections. Responsive to the Office Action mailed on March 24, 2006 in the above-referenced application, Applicant respectfully requests reconsideration of the rejections for at least the reasons set forth below.

Present Status of Application

Claims 9-10 and 12-19 were rejected under 35 U.S.C. 103(a) as allegedly unpatentable over Fujikawa et al (U.S. 6,297,519) in view of Lee et al. (U.S. 6,737,305). Applicant respectfully submits that claim 9 is patentable for at least the reasons discussed below.

Independent claim 9 recites:

9. An interconnect structure, comprising:
a substrate having a surface;
a dielectric layer disposed on the surface of the substrate;
a first metal layer disposed in the dielectric layer, having a first and second end,
wherein the direction extending from the first end to the second end is parallel to the substrate surface;
a second metal layer disposed on the dielectric layer, wherein the second metal layer is isolated from the first metal layer by the dielectric layer; and
a plurality of conductive plugs parallel to extending direction of the first metal layer disposed in the dielectric layer and on the first end of the first metal layer to electrically connect the second metal layer,
wherein the first metal layer and the second metal layer are a gate metal layer and a source/drain metal layer of a TFT array respectively.

(Emphasis Added)

As expressly recited in claim 9, the interconnect structure comprises a plurality of conductive plugs parallel to extending direction of the first metal layer disposed in the dielectric layer.

In page 3 of the Office Action, the Examiner asserts that “a plurality of conductive plugs (portions

35b in the contact holes) parallel to extending direction of the first metal layer disposed in the dielectric layer 4...”. Applicant respectfully disagrees.

Referring to Col. 7, line 53 to 63 of US 6,297,519, Fujikawa teaches:

FIG. 4B is a cross sectional view taken along one-dot chain line B4–B4 shown in FIG. 3. The inspection gate terminal 22 made of Cr is formed on the surface of the glass substrate 1. The gate insulating film 4 and protective insulating film 30 are laminated covering the inspection gate terminal 22. ***The contact hole 25b*** is formed through the two layers, gate insulating film 4 and protective insulating film 30. As shown in FIG. 3, ***the contact hole 25b is disposed slightly inside the outer periphery of the inspection gate terminal 22, and has a ring shape extending along the outer periphery.***

Fujikawa teaches the contact hole 25b is disposed slightly inside the outer periphery of the inspection gate terminal 22, and has a ring shape extending along the outer periphery. As well, Fujikawa only teaches **a ring shape contact hole** extending along the outer periphery. Significantly, Fujikawa does not disclose a plurality of conductive plugs parallel to extending direction of the first metal layer disposed in the dielectric layer in claim 9. For at least this reason claim 9 defines over the cited art.

Further to this end, in connection with FIG. 3 and FIG. 4B, Fujikawa teaches the first plug and the second plug 25b perpendicular to the first metal line 11. Fujikawa, however, does not teach or suggest a ***plurality of conductive plugs parallel to extending direction of the first metal layer*** disposed in the dielectric layer and on the first end of the first metal layer to electrically connect the second metal layer, as specified in claim 9.

MPEP 2142 reads in part:

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the

prior art, and not based on applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

In connection with the third criteria, MPEP 2143.03 goes on the state:

To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

Applicant therefore submits that, even if the combination is proper, the combination of Fujikawa and Lee fails to teach or suggest all of the limitations recited in claim 9. For at least this reason, claim 9 is allowable over the cited references, and reconsideration of this rejection is hereby respectfully requested.

Independent claim 14 recites:

14. An interconnect structure, comprising:
a substrate having a surface;
a dielectric layer disposed on the surface of the substrate;
a first metal layer disposed in the dielectric layer, having a first and second end,
wherein the direction extending from the first end to the second end is parallel to the substrate surface;
a second metal layer disposed on the dielectric layer; and
a plurality of plugs parallel to extending direction of the first metal layer disposed on the first end of the first metal layer, wherein the plug farther from the first end of the metal layer is conductive and electrically connects the second metal layer.

(Emphasis Added)

As expressly recited in claim 14, the interconnect structure comprises plurality of plugs parallel to extending direction of the first metal layer disposed on the first end of the first metal layer.

For the same reasons described above in connection with claim 9, the combination of Fujikawa and Lee also fails to teach or suggest all of the limitations recited in claim 14. For at least this reason, claim 14 is allowable over the cited reference, and reconsideration of this rejection is hereby respectfully requested.

Independent claim 18 recites:

18. An interconnect structure, comprising:
a substrate;
a dielectric layer disposed the substrate;
a first metal line disposed in the dielectric layer, having a first and second end,
wherein the direction extending from the first end to the second end is parallel to the
substrate surface;
a first plug and a second plug disposed on the first end of the first metal line,
wherein the first plug is closer to the first end than the second plug;
a second metal line disposed on the dielectric layer, connecting the first metal line
through the second plug.

(Emphasis Added)

As expressly recited in claim 18, the interconnect structure comprises a first plug and a second plug disposed on the first end of the first metal line.

For the same reasons described above in connection with claim 9, the combination of Fujikawa and Lee also fails to teach or suggest all of the limitations recited in claim 18. For at least this reason, claim 18 is allowable over the cited reference and reconsideration of this rejection is hereby respectfully requested.

Hence it is believed that the claims 9 and 14 are allowable over the cited references. Insofar as claims 10-13 depend from claim 9 and claims 15-17 depend from claim 14, it's Applicant's believe that these claims are also allowable at least by virtue of their dependency.

Newly added claims

New claim 20 recites:

20. An interconnect structure, comprising:
a substrate;
a dielectric layer disposed the substrate;
a first metal line disposed in the dielectric layer, having a first and second end,
wherein the direction extending from the first end to the second end is parallel to the
substrate surface;

a first plug and a second plug disposed on the first end of the first metal line, wherein the first plug is closer to the first end than the second plug;
a second metal line disposed on the dielectric layer, connecting the first metal line through the second plug, wherein *the second metal line does not connect to the first plug.*

(Emphasis Added)

As emphasized above, the interconnect structure in claim 20 comprises the second metal line not connecting to the first plug.

Fujikawa, however, does not teach the second metal line does not connect to the first plug. Indeed, as shown in FIG 4B, Fujikawa teaches the terminal protective conductive film 35b connected via **both the contact holes 25b** to the inspection gate terminal 22. As well, Fujikawa teaches the second metal connects to the first plug.

MPEP 2142 reads in part:

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. In re Vaec, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

In connection with the third criteria, MPEP 2143.03 goes on the state:

To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

Applicant therefore submits that even when taken in combination, Fujikawa and Lee fail to teach or suggest all of the limitations recited in new claim 20. For at least this reason, new claim 20 is allowable over the cited reference. Reconsideration of this rejection is hereby respectfully requested.

New claim 21 recites:

21. An interconnect structure, comprising:
a substrate;
a dielectric layer disposed the substrate;
a first metal line disposed in the dielectric layer, having a first and second end, wherein the direction extending from the first end to the second end is parallel to the substrate surface;
a first plug and a second plug disposed on the first end of the first metal line, wherein the first plug is closer to the first end than the second plug;
a second metal line disposed on the dielectric layer, connecting the first metal line through the second plug, wherein *the first plug and the second plug are only connected in a direction parallel to the second metal line.*

(Emphasis Added)

As emphasized above, the interconnect structure in claim 21 comprises the first plug and the second plug are only connected in a direction parallel to the second metal line. Fujikawa, however, does not teach the first plug and the second plug are only connected in a direction parallel to the second metal line.

Applicant therefore submits that even when taken in combination, Fujikawa and Lee fail to teach or suggest all of the limitations recited in new claim 21. For at least this reason, new claim 21 is allowable over the cited reference. Reconsideration of this rejection is hereby respectfully requested.

Conclusion

The Applicant believes that the application is now in condition for allowance and respectfully requests so.

All pending claims 9-10 and 12-19 are believed to be in condition for allowance, and the Examiner is respectfully requested to pass those claims to issuance. If the Examiner believes a teleconference will expedite the examination of this application, the Examiner is invited to contact the undersigned attorney at 770-933-9500.

No fee is believed to be due in connection with this Amendment and Response to FINAL Office Action. If, however, any fee is deemed to be payable, you are hereby authorized to charge any such fee to deposit account 20-0778.

Respectfully submitted,

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